



# CSIR NEWS

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## Centre for Cellular and Molecular Biology at RRL, Hyderabad

A 'Centre for Cellular and Molecular Biology' has been set up by the Council of Scientific & Industrial Research (CSIR) at the Regional Research Laboratory (RRL), Hyderabad, and has started functioning from 1 April 1977. The Centre is a semi-autonomous unit and is headed by Dr P. M. Bhargava of RRL. The objectives of the Centre are:

(1) To conduct research in frontier and multidisciplinary areas of modern biology and to seek potential applications of this work.

(2) To carry out exploratory work with a view to aiding the development of biochemical and biological technology in the country on a sound basis. The suggested areas of thrust are: (i) studies related to development of newer methods of control of fertility; (ii) studies related to development of biology-based pest control methods; and (iii) studies on genetic engineering in plants and microorganisms which may, for example, lead to reduction in the requirement of chemical fertilizers.

(3) To train people in the advanced areas of biology with special provision for short-term training of staff from other institutions in techniques for which adequate facilities may not exist elsewhere.

(4) To provide centralized facilities in the country for new and modern techniques in the inter-disciplinary areas of biology and to ensure that these facilities are put to maximal use

by research workers from other laboratories and institutions in the country.

(5) To interact adequately with other institutions doing basic or applied work in areas related to the activities of the Centre.

(6) To collect, collate and disseminate information relevant to biological research.

The establishment of the Centre fulfills a long-felt need in the country for providing the necessary thrust in the areas of molecular and cellular biology, which are recognized as frontier areas of science the world over. Discoveries in these fields have not only contributed to solutions to some of the basic questions concerning life processes, but have also made significant contributions in applications to agriculture, veterinary and medical sciences and even to industry. The Centre is the first of its kind established in the country to work exclusively in the area of modern biology.

The Biochemistry Group of RRL, which was being headed by Dr Bhargava and which forms the nucleus of the Centre, has made notable contributions during the past 20 years, specially in reproductive biochemistry, preparation and properties of cell suspensions, regulation of growth, cell division and malignant transformation, regulation of macromolecular synthesis, metal-nucleic acid interaction, and certain aspects of protein chemistry.

## CSIR Takes Over Biochemicals Unit

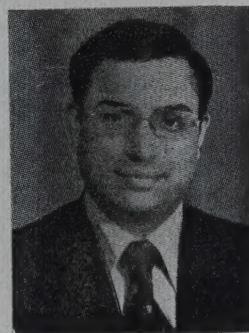
The Council of Scientific & Industrial Research (CSIR) has taken over the administrative control of the Biochemi-

cal Unit from the V.P. Chest Institute, Delhi University, Delhi, with effect from 1 May 1977. The Unit will now function as a 'CSIR Centre for Biochemicals' with an advisory committee.

Dr A.P. Joshi, who was heading the Biochemicals Unit, has been designated as Scientist-in-charge, CSIR Centre for Biochemicals, V. P. Chest Institute, Delhi 110007.

## Prof. P. K. Rohatgi Appointed Director of CSIR Kerala Complex

Prof. Pradeep Kumar Rohatgi of the Indian Institute of Science (IISc), Bangalore, has been appointed Director of the CSIR Kerala Complex, Trivandrum, with effect from 1 August 1977.



Prof. Rohatgi (born 18 Feb. 1943) received his bachelor's degree in metallurgical engineering from the Banaras Hindu University (1961), and S. M. in metallurgy (1963), and doctor of science in metallurgy (1964)

from the Massachusetts Institute of Technology, USA. Since 1972 Dr Rohatgi had been a professor in the Departments of mechanical engineering, metallurgy and industrial management at IISc where he taught and directed research in solidification, foundry technology, materials science, composites, technological forecasting and research management.

From 1964 to 1968, Dr Rohatgi worked with the Paul D. Merica



Research Laboratory of The International Nickel Company, Suffern, USA. He was a visiting faculty member, during June 1968 to July 1969, at the Indian Institute of Technology, Kanpur. From 1969 to 1972, he was with Homer Research Laboratories, Bethlehem Steel Corporation, Bethlehem, USA.

Prof. Rohatgi has been a member of NCST panels on futurology, metallurgy and village industries. He is on the editorial board of Cast Metals Research Journal of the American Foundrymen's Society (USA), Indian Foundry Journal, and Transactions of the Indian Institute of Metals. He has reviewed a number of books on materials science for Tata McGraw-Hill Publishing Co. Ltd. He has been a member of the American Society of Metals, the Metallurgical Society of AIME and the American Foundrymen's Society. He is currently a member of the Indian Institute of Foundrymen, and the Indian Institute of Metals.

Prof. Rohatgi has published more than 70 papers in various disciplines including metallurgy, materials science, tribology, technological forecasting and research management (in the areas of food, energy, health and education). He has 18 inventions to his credit, five of which have been patented in USA. He has co-authored a book titled "Technology Forecasting for a Developing Country like India" to be published by Tata McGraw-Hill Publishing Co. Ltd.

Prof. Rohatgi is the recipient of the 1976 National Metallurgists' Day award of the Union Ministry of Steel and Mines; the 'Best Work in 1969' award of the American Foundrymen's Society in Light and Reactive Metals; University gold medal from the Banaras Hindu University; Hadfield medal from the Mining and Metallurgical Society of India; and the third Indranil award for 1975-76 of the Mining, Geology and Metallurgical Society of India.

## Independence Day Awards of NRDC

Twelve CSIR scientists have been named for the Independence Day awards of the National Research Development Corporation of India for meritorious inventions. Given below is a list of the inventors and the processes/products developed by them :

Sarvashri D. R. Rajanna and K. Narayana of the National Aeronautical Laboratory, Bangalore, and Sarvashri V. A. Thomas, Israel Selvaraj, R. K. Gupta and N. S. R. Chandrasekhar of the Indian Space Research Organisation, Bangalore, have been jointly awarded Rs 3000. These scientists have developed a vertical dynamic balance machine which employs flexural concept for directly measuring data. This machine was used for testing Aryabhata.

Dr S. K. Basu of the Central Mechanical Engineering Research Institute, Durgapur, and Dr H. Bagchi of the Mechanical Engineering Research and Development Organisation, Poona, have been jointly awarded Rs 3000 for the development of a magnetic particle clutch.

An award of Rs 2000 has been given jointly to Dr H. C. Srivastava of the Ahmedabad Textile Industry's Research Association, Ahmedabad, and Dr S. N. Harshe of Indore for the development of a process for the preparation of low-viscosity tamarind kernel powder which can be used in place of starch as a warp sizing material in cotton textile processing.

Dr H. V. K. Udupa and Sarvashri R. Thangappan, B. R. Yadav and P. Subbiah of the Central Electrochemical Research Institute, Karaikudi, have been jointly awarded Rs 2000 for developing titanium substrate insoluble anodes.

Shri A. Bagchi of the Central Mining Research Station, Dhanbad, has been awarded Rs 1000 for the development of a hydrocarbon vapour detector tube for high boiling petroleum products. The detector is used for estimating hydrocarbon concentration in

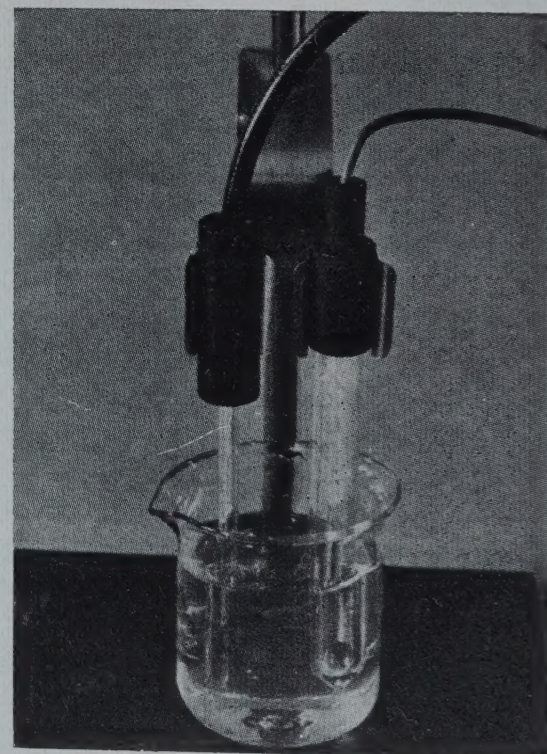
emptied fuel oil tanks prior to servicing or repairing.

Shri K. M. Swamy and Shri R. S. Rohela of the Regional Research Laboratory, Bhubaneswar, have been awarded certificates of merit for developing an ultrasonic therapy unit.

## CGCRI Develops Ion Selective Glass Electrodes

The Central Glass & Ceramic Research Institute (CGCRI), Calcutta, has developed three types of ion selective glass electrodes, viz. (i)  $\text{Na}^+$  and  $\text{K}^+$  glass electrodes, (ii) low impedance glass electrode for pH measurements, and (iii) capillary glass electrode for measurement of blood pH.

*$\text{Na}^+$  and  $\text{K}^+$  glass electrodes*—The classical methods for estimation of soda and potash are very tedious and time consuming while the flame spectrophotometric method involves expensive instruments. CGCRI has developed ion selective glass electrode for selective estimation of sodium and potassium in various samples without using any costly equipment. The estimation can be carried out rapidly and accurately. The performance of the electrodes has been tested in re-



Sodium ion glass electrodes used for rapid estimation of sodium : CGCRI, Calcutta



lation to standard samples and is found to be highly satisfactory. Such glass electrodes have wide scope for application in agriculture, biology, oceanography and industries. The salient characteristics of these electrodes are :

dc Resistance at 27°C	
for Na <sup>+</sup> ion electrode	: 30-75 MΩ
for K <sup>+</sup> ion electrode	: 3-50 MΩ
pNa range	: 1.00-4.00, i.e. 2299.00-2.99 ppm of Na <sup>+</sup> ion
pK range	: 1.70-3.00, i.e. 782.00-39.10 ppm of K <sup>+</sup> ion.

The process has been leased to ELICO Pvt. Ltd, Hyderabad, for commercial exploitation.

*Low impedance glass electrode for pH measurements*—For rapid and accurate estimation of acidity or alkalinity of a solution, the institute had developed earlier glass and calomel electrodes for pH meters. The process was also leased to two parties for commercial production. A low impedance glass electrode for pH meters having thicker glass membrane and covering the entire pH range 0-14 has recently been developed at the institute. The salient characteristics of the electrode are :

dc resistance at 27°C	: 25-100 MΩ
pH range	: 0-14
Temp. range	: 0-75°C
Sodium ion error	: Low
Mechanical strength of pH-sensitive glass bulb	: high due to thicker membrane

The process has been leased to the Electronics Corporation of India Ltd, Hyderabad, for commercial exploitation.

*Capillary glass electrode for measurement of blood pH*—For determining the acid-base equilibrium in the blood of a patient, precise measurement of blood pH is essential. Determination of blood pCO<sub>2</sub> is also a necessary prerequisite for selection of an appropriate course of treatment.

Blood pH capillary electrodes required in conjunction with an anaesthesia monitoring unit have so far

been imported at a very high cost. Investigations were carried out at CGCRI for development of such electrodes using low impedance glass composition. The electrodes developed were tested and found to have satisfactory performance in the laboratory as well as in actual monitoring unit of Electronics & Radar Development Establishment (LRDE), Bangalore. The results obtained with the CGCRI electrode were found comparable to those of a standard Beckman electrode.

### Ipsilateral Reflex Studies on Human Ear

The nature and cause of the change in the acoustic impedance due to ipsilateral sound stimulus, with emphasis on its utility for clinical examination of the ear, were investigated by Dr Ved Ram Singh of the National Physical Laboratory, New Delhi, at the Institute of Biomedical Engineering of the University of Toronto, Toronto, Canada, and the Department of Otolaryngology of Mount Sinai Hospital in Toronto. Dr Singh was on study leave in Canada under a Commonwealth scholarship offered by the Government of Canada.

In his studies Singh used ten normal living human subjects, i.e. 20 ears, 41 temporal bones and 17 mechanical models of the ear. The human temporal bones were obtained from the Ear Bank at the Best and Banting Institute of the University of Toronto. Mechanical ears were designed and developed by Singh. The temporal bones and mechanical models of the ear were tested for tympanometric, acoustic reflex and other characteristics before the investigation.

The acoustic impedance was found to increase with the application of the ipsilateral sound stimulus. The maximum decrease in compliance (i.e. increase in impedance) was observed as 0.11 cc at or near-zero pressure in the external cavity of a particular normal ear. One of the reasons for the acoustic impedance change was found to be the contraction of the middle-ear muscles.

Up till now it has been reported that the change in the acoustic impedance of the human ear is only due to the contraction of the tympanic muscles, but according to Singh's investigation, this is not true. A comparative study of the acoustic impedance changes during ipsilateral sound stimulus in living human ears, mechanical ears, and fresh and old (stale) temporal bones, indicated that the change was seen even in the absence of tympanic muscles (i.e. in mechanical ears as well as in old stale bones). This proved that, in addition to muscle activity, the impedance change was also due to some physiological characteristics of the eardrum itself and some induced phenomenon of the ear.

The compliance of the eustachian tube was found to change during the ipsilateral stimulation, and this became one of the physiological causes of the acoustic impedance changes of the ear.

The position of the tympanograms was found to change beyond an intensity of 75 dB SPL (sound pressure level) in a particular case. This was useful in getting an additional information about the behaviour of the eardrum and for the estimation of magnitude of the middle ear pressure.

By generating tympanograms by varying air pressure in the human ear canal from +200 to -200 and again from -200 to +200 mm H<sub>2</sub>O, a hysteresis effect was observed. Thus, the actual value of the acoustic impedance changes could be obtained by applying a correction factor due to this hysteresis effect.

In temporal bones and mechanical ears, the cavities of the ear were filled with water volumes and compliance changes of the ear were monitored with and without ipsilateral reflex.

When the tympanic muscles perform a reflex contraction in response to any stimulus, the activity in the muscles does not begin immediately after the arrival of the stimulus, but starts after a latent period, termed the 'latency' of the reflex. 'Latency' studies were carried out for ipsilateral stimulation at various pressures in the external ear



and appropriate correction factors were calculated for knowing the absolute values of the acoustic impedance changes.

The importance of the relaxation time is probably greatest when considering the effect of the reflex on a series of impulses heard in rapid succession. The relaxation time for the ipsilateral reflex of 1000 Hz, 90 dB SPL, in a particular man, was found to be 0.25 sec. for a stimulus duration of 2 sec. Again, this was used as a correction factor for determining the absolute values of the acoustic impedance changes.

The ipsilateral reflex 1000 Hz, 90 dB SPL was stimulated for longer durations by a steady-state noise (pure tone) and the activity of the middle ear muscles was studied. The magnitude of the response of the reflex wave was found to vanish to its initial value after a continued stimulation of 200 sec. in particular normal human ears.

In human temporal bones the external meatus was stimulated by passing a small electric current through the skin between two electrodes, the temporal bones being connected through an earpiece to the electro-acoustic impedance bridge. An impedance change was caused for short duration at the eardrum on the stimulated side irrespective of the duration of stimulation.

Based on the results, a dynamic model for the ipsilateral acoustic reflex was developed.

The study of the ipsilateral reflex is itself a useful technique in the routine audiological assessment, but the changes in the acoustic impedance due to ipsilateral stimulus are more important and useful as a diagnostic tool. The dynamic properties of the reflex provide an understanding of the function of the middle ear muscles and actual nature and causes of the impedance changes and hence of the ear diseases and infections. The dynamic model becomes a more complete engineering method of describing the time history of the response than

resort to empirical measures such as latency and adaptation.

### **Biological Effects of Silica and Silicate Dust in Mice**

Studies on the biological effects of silica and silicate dusts on mice have been made at the Industrial Toxicology Research Centre, Lucknow, by Shri A. P. Sahu, under the guidance of Prof. S. H. Zaidi. Mice inoculated intratracheally with silica dust revealed acute inflammatory reaction in the lung parenchyma at early periods. The fibrotic reaction at 210 days comprised thick, compactly arranged reticulin fibres with a few collagen fibres around bronchi and blood vessels. The lesions observed in mice were in no way comparable to those in human beings and the atypical tissue response to silica dust in mice was attributed to different tissue reactivities.

Following intratracheal inoculation, amosite produced thick reticulin fibrosis while thin reticulin fibres developed with anthophyllite or tremolite in the lungs of mice. The formation of asbestos bodies did not take place. The deviation in the fibrogenic response in mice was attributed to species differences.

The fibrosis produced by kaolin, mica or talc was restricted to thick reticulin fibres. Although there was transport of dust from lungs to the tracheobronchial lymph nodes, the fibrotic reaction in the nodes was negligible.

Silica produced collagenous fibrosis much earlier than amosite, anthophyllite, tremolite, kaolin, mica or talc in omentum. Besides, there was considerable transport of dust including asbestos from peritoneal cavity to the liver lymph nodes and tracheobronchial group of lymph nodes which was brought about through the agencies of lymphatics. In the lymph nodes silica produced a most marked degree of fibrosis.

It was concluded that albino mouse was not suitable for experimental pneumoconiosis studies as the experi-

mental pulmonary lesions observed in this species of rodents did not simulate the human lesions. However, these studies have shown that lymphatics and lymph nodes contribute a great deal to the spread of asbestos fibres. The results further tentatively support the possibility of involvement of the lymphohematogenous route in the causation of mesothelioma by asbestos fibres.

Shri Sahu has been awarded a Ph.D. degree of the University of Lucknow for his thesis based on these studies.

## **PROGRESS REPORTS**

### **CSMCRI Annual Report : 1976**

The annual report of the Central Salt & Marine Chemicals Research Institute, Bhavnagar, for 1976, brought out recently, shows that R & D activities of the institute were spread over five major areas, viz. Salt, and marine & inorganic chemicals; Desalination comprising reverse osmosis, electro-dialysis and ion-exchange; Sea water irriculture; Marine algae; and Solar energy. In all, 30 projects, entailing a financial input of Rs 64.490 lakh, were investigated during the year.

The institute established that the series-feeding system has advantage over parallel-feeding system practised in the Indian salt works. Syngenite (double sulphate of potassium and calcium) developed by the institute has been found to work at par with the presently imported potassium sulphate. Know-how for the preparation of molecular sieves has been worked out using indigenous materials.

In the area of desalination, three reverse osmosis plants were fabricated for different parties. Efforts to find a better alternative membrane led to the preparation of 8 ft long membrane using cellulose acetate and polymethyl methacrylate. It gave 90% salt rejection and 12 gfd flux with long membrane life.

Processes for manufacturing potassium carbonate, sodium carbonate,



potassium silicate and potassium nitrate were developed.

Solar stills of 5000 litres/day capacity were proposed to be installed in 10 villages. Two such solar stills in two non-electrified villages where only brackish water was available were under construction.

In the area of sea-water iriculture, 9 acres of land have been sown with Bajra Babapuri and 240 kg of sugar-beet grown with diluted sea-water were processed for extraction of juice by diffusion.

The biogas plant was operated with 75 kg seaweed feed, and an average daily production of 140 litres of gas was obtained.

Evaluation of the household solar cooker was undertaken. The flash distillation unit was run round the clock to prove its viability for water reuse system at the instance of a local industrial unit.

Fifty-nine research papers were published during the year.

### CFRI's Progress of Research : 1976

The Central Fuel Research Institute (CFRI), Dhanbad, in its brief mimeographed report on 'Progress of Research : 1976' shows that 143 sub-projects under seven areas of research and development activities were investigated including 24 sub-projects sponsored by outside organizations. Investigations in respect of 33 sub-projects were completed during the year, some of which were on laboratory scale.

The R&D activities of the institute were continued in the areas of resource quality assessment of coals, upgrading of inferior coals for better use, synthetic oil from coal, selection of coking blends, processed solid fuels for metallurgical and domestic uses, improvement in the performance of coal-based thermal power stations, process development for production of chemicals based on coal-tar byproducts, a new nitrogenous fertilizer from coal, industrial carbon, coal science and coal

systematics studies. The institute also rendered assistance to industries and public sector undertakings on technical problems.

In view of the recent decision to raise the annual production of coal from the present 100 million tonnes to 300 million tonnes by 1990 there had been a great tempo of the exploration work during the period and, as a result, about 1070 borehole cores covering a core length of 20,700 m were received by the CFRI's coal survey laboratories for processing and analysis. A total of 20,300 m of borehole cores was processed as against 12,600 m in 1975.

At the instance of shipping insurance organizations, CFRI completed a crash investigation on the problem of spontaneous combustion of coal vis-à-vis its carriage in ships for export. The investigation included work simulating the shipment of coal in ship-holds with large steel vessels, under varying conditions of temperature and humidity as would be prevailing during the 21-day voyage of a cargo ship from an Indian port to an European port.

At the request of Coal India Ltd, CFRI studied the problem of safe stocking of large amounts of coal at the Haldia port.

Demineralization by oil-agglomeration technique developed by CFRI was given high priority for development on commercial scale. A draft project report has been prepared by HSL (R&D), based on CFRI data, for a 10 tonnes/hr agglomeration plant to be installed at Bhilai Steel Plant for trial runs on injection of low-ash coal in the blast furnace.

A plant of capacity 100 tonnes/day based on CFRI formed-coke technique was erected near Ghaziabad in U. P. by Kakar Fuels Pvt. Ltd and was commissioned for production of industrial/domestic fuels. Assistance was given to the party in overcoming the initial problems. The process was also licensed to two more parties for commercial exploitation.

Bharat Coking Coal Ltd, Jharia, was about to commission a 100 tonnes/day capacity pellet coke plant at

Khas Kusunda colliery on the basis of know-how of pelletization supplied by CFRI for production of smokeless fuel for domestic use by utilizing inferior quality Jharia coals. Technical advice was given to Coal India Ltd on Talcher formed-coke plant of 600 tonnes/day throughput capacity.

A commercial low-temperature carbonization (LTC) plant of capacity 1500 tonnes/day coal throughput, based on CFRI's LTC plant, was proposed to be set up by Coal India Ltd at Dankuni in West Bengal.

A pilot plant of 18 kg/hr coal capacity was being erected at the institute for production of oil from coal by direct hydrogenation route. A semi-pilot plant of 4.5 litres/day capacity was also designed for synthesis of oil from CO and H<sub>2</sub> by the Fischer-Tropsch process.

A fluid bed combustion of a rating capacity of 2 tonnes equivalent steam per hour based on CFRI developed fluid bed combustion technique was installed at the institute in collaboration with BHEL for obtaining basic design data for building up a full-scale unit.

After successful field trial runs of a direct paddy husk fired combustor-cum-heat exchanger in a rice mill, a scaled-up design of a unit capable of producing 165 m<sup>3</sup> of hot air at 93°C per minute was made. A joint programme was drawn up by the Ministry of Food & Agriculture, the Food Corporation of India, CFRI and the Central Mechanical Engineering Research Institute for fabrication and trial of a prototype unit of the above capacity.

Based on CFRI process, a commercial plant of 30 tonnes/day of 4-cyanopyridine from 4-picoline was commissioned in Ahmedabad. Initial trial runs were in progress. Another process of CFRI was licensed to Eastern Naphtha-Chem, Dhanbad, for a 600 tonnes/year plant of beta-naphthol from naphthalene at Bokaro.

The total revised budget estimates of CFRI for the year 1976-77 was of the order of Rs 191 lakh. The institute earned Rs 3.87 lakh as a result of



analytical and testing work and about Rs 1.6 lakh for sponsored work. Fifty-three research and review papers and

18 technical and project reports were published during the year. Three patents were filed.

## CSIR SUPPORT TO RESEARCH

### Completed Schemes

#### Coordination Compounds of Organotin(IV) with Schiff Bases

The interaction of organotin(IV) halides with Schiff bases has been studied under a CSIR scheme by Prof. T. N. Srivastava of the Department of Chemistry, Lucknow University, Lucknow. These Schiff bases, formed by the condensation of salicylaldehyde or 2-hydroxy-1-naphthaldehyde with aniline, its substituted derivatives, 2-aminopyridine and ethanolamine, have yielded a number of molecular adducts of 1 : 2 stoichiometry with the organotin halides. The IR data of the intense yellow-red coloured adducts indicate that the two molecules of neutral monodentate ligand are coordinated through azomethine N atom and the *o*-hydroxy group is not involved in complexation. The adducts are dissociated into parent components in solution as evident from molar conductance and electronic spectral data. The Schiff base of salicylaldehyde ethanolamine, which has two labile H atoms, on reaction with diorganotin dichloride in the presence of NaOCH<sub>3</sub> in methanol yields penta coordinated diorganotin(IV) complexes in which the base acts as a terdentate ligand. Tin (IV) in these complexes is coordinatively unsaturated and forms stable hexa coordinated adducts with oxine.

#### Isolation and Characterization of Some Mixed Halocobaltates(II)

The isolation and characterization of some mixed halocobaltates(II) were studied in a CSIR-supported research project by Shri A. Saxena, junior research fellow, working at the Indian Institute of Technology (IIT), Delhi.

Saxena carried out electronic spectral (visible and near infrared), far infrared (400-100 cm<sup>-1</sup>), magnetic moment and conductance studies to get an insight into the structural aspects of these complexes. While the mixed tetrahalocobaltates(II) were found, as expected, to be tetrahedral, the mixed tri- and the pentahalocobaltates(II) revealed a tetrahedral environment around Co(II). Pentahalocobaltates(II) were formulated as double salts containing a tetrahalocobaltate(II) species and for trihalocobaltates(II) a linear chain structure with bridging halogens was favoured over a possible dimeric unit structure. The values for  $10Dq$ ,  $B'$  and  $\lambda'$  were calculated. Assignment of the bands in the far infrared region was done. An attempt was made to explain the abnormally high and abnormally low magnetic moment values found (at room temperature) for pentahalocobaltates(II) and trihalocobaltates(II) respectively, because they contained a tetrahedrally surrounded Co(II). Molar conductance values measured at a fixed concentration in acetonitrile to characterize these complexes were shown to lead to deceptive results. For trihalocobaltates(II), Debye-Hückel-Onsager equation showed them to be, at least in solution, (1 : 1) electrolytes. Unit cell dimensions for some of the complexes were determined from X-ray powder diffraction patterns.

Shri Saxena has submitted his thesis based on these investigations for the award of a Ph.D. degree of IIT, Delhi.

#### Electrophotographic Discharges in Organic and Inorganic Photoreceptors

The electrophotographic discharges in the polystyrene binder layers of HgI<sub>2</sub> and CdS, in the silicone-resin binder layers of ZnCdS activated with

100 ppm Ag, and in the solution-coated single and double layers of polyvinyl carbazole (PVK) and its 1:1 molar ratio charge-transfer complex (PVK : TNF) with trinitrofluorenone (TNF) were investigated by Shri S. K. Agarwal, a CSIR research fellow. Shri Agarwal worked at the Indian Institute of Technology (IIT), Delhi, under the guidance of Prof. P. K. C. Pillai.

The photocurrent ( $i_{ph}$ ) to dark current ( $i_d$ ) ratio and the special sensitivity in the 60 : 40 composition of HgI<sub>2</sub> : CdS were found to be the maximum among the HgI<sub>2</sub> : CdS layers. Exponential distribution of trapping centres and an activation energy of  $\approx 0.2$  eV for the trapping process have been found in the layers of this composition. The surface charge saturates within 5 sec. of corona charging. With the initial potential of 700 V, a contrast potential of 425 V is achievable in these layers, with an exposure of 50  $\mu W$  cm<sup>-2</sup> sec.

The trap-filled space charge limited photo-current ( $i_{ph} \propto V^5$ ) is obtained in ZnCdS : Ag layers. The illumination intensity dependence of the dark polarization current suggests the conversion of trapping centres into recombination centres with illumination. The quantum efficiency maximum (23%) and the spectral sensitivity maximum occur at 460 nm. The layers could be charged to 1080 V in 5 sec. and result in a contrast potential of 780 V with an exposure of 250  $\mu W$  cm<sup>-2</sup> sec.

The photoelectret studies indicate a field-assisted detrapping mechanism in PVK. The quantum efficiency is 42% in PVK : TNF and PVK-PVK : TNF (double layers) and remains appreciably constant in the visible region. But the spectral sensitivity in PVK : TNF is nearly half as compared to that in double layers. With an initial potential of 1100 V the double layer gives a contrast potential of 600 V with an exposure of 0.4  $\mu W$  cm<sup>-2</sup> sec.

The studies show that 60% by weight of polystyrene for HgI<sub>2</sub> : CdS layers and 30% by weight of silicone-resin for ZnCdS : Ag layers are the



appropriate binder contents for electrophotographic applications. These investigations lead to the conclusion that ZnCdS : Ag silicone-resin layers and PVK-PVK : TNF (double layers) are well suited for the fabrication of transfer electrophotographic photo-receptor media. The studies also enabled the evaluation of photoelectric parameters in composite photo-receptors.

Based on these studies Shri Agarwal has submitted a thesis for the Ph. D. degree of IIT, Delhi.

### New Schemes

#### Experimental Ancylostomiasis : Cell Transfer Studies in Relation to Immunity during Hookworm Infection

A systematic study of the mechanism of conferring acquired immunity through transfer of immunized cells during hookworm infection is proposed to be made by Dr G. N. Johri, Reader in Zoology, Vikram University, Ujjain, under a new CSIR research scheme sanctioned to him. Hookworm infection has been one of the major cosmopolitan diseases afflicting human beings and domesticated animals especially in warm moist climate, the main symptoms of the disease being anaemia, general weakness and emaciation. Infection takes place by the ingestion of infective young ones with contaminated food or water.

In tests that will be carried out on Swiss albino mice, different measured doses of immunized peritoneal exudate, spleen, lymphoid, thymus and bone marrow cells from sensitized donors will be transferred to recipients. Observations with regard to the onset and development of immune response in the recipients will be made to assess and compare the extent of immunity conferred. These studies may also be extended to experimental pups and are expected to help in the understand-

ing of the mechanism involved in cell-mediated immunity in this particular infection and may eventually form an important tool to check hookworm infection.

### PATENTS FILED

143/Del/77 : A process for the production of barium/calcium petroleum sulphonates useful as detergent-dispersant additives for motor oils, O. N. Anand, V. P. Malik & K. S. Anand—IIP, Dehra Dun.

145/Del/77 : Bamboo-crete roof for low-cost housing, U. C. Kalita, A. C. Khazanchi, B. C. Barthakur, G. Thyagarajan & H. Bora—RRL, Jorhat.

146/Del/77 : Improvements in or relating to phosphating of iron and steel surface, B. Sathianandham, K. Balakrishnan & N. Subramanyan—CECRI, Karaikudi.

150/Del/77: Byproduct recovery convertible coke oven, K. Singh & M. V. Prabhakara Menon—CFRI, Dhanbad.

### PERSONNEL NEWS

#### Appointments/Promotions

#### Dr B. C. Sinha

Dr B. C. Sinha of the Central Glass and Ceramic Research Institute (CGCRI), Calcutta, has been appointed, on promotion, Scientist EI at CGCRI with effect from 8 May 1977.

Dr Sinha (born 1 Feb. 1927) graduated with honours in chemistry (1951) and obtained his M. Sc. (1952) from the Dacca University and D. Phil. (1962) from the Calcutta University. After serving in M. E. E. College, Tripura, and Karimganj College, Assam, he joined CGCRI in November 1955. Dr Sinha has made valuable contributions in applied analytical chemistry and set up an active school of research on applied analytical chemistry of silicates at CGCRI. He has about 50 research papers to his credit, and his publications on complexometric methods for determination of zirco-

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nium, phosphate, barium and strontium; volumetric determination of boron; and polarographic determination of selenium and other ceramic constituents have earned international recognition.

Under CSIR-British Council exchange programme of scientists, Dr Sinha visited a number of universities in UK and worked on atomic absorption spectroscopy in Strathclyde University, Glasgow, and Imperial College of Science and Technology, London.

Dr Sinha served as a UNIDO expert in laboratory and process research in Libya for a year. He is a fellow of the Institution of Chemists and member of the Indian Ceramic Society. He is also associated with various committees and subcommittees of the Indian Standards Institution.

#### Shri B. K. Pandey

Shri B. K. Pandey, Scientist C, of CGCRI has been promoted to Scientist EI with effect from 17 December 1976. Shri Pandey (born 6 June 1936) obtained his degree in mechanical engineering (1958) from the Jadavpur University, Calcutta, and joined Annapurna Metal Works as assistant mechanical engineer. In 1959 he joined CGCRI and became a plant engineer in 1962 and Scientist C in 1967. He has contributed in a large way towards the planning and technology development for the production of radiation shielding glass windows and various equipment and machines for the optical glass plant. Under his guidance a large number of apparatus, equipment, machine and furnace have been designed and developed for various R&D projects of the institute. He visited Japan in 1971 under Colombo Plan for a group course in glass technology. In 1976 he went to Romania under Indo-Romanian Agreement on technical cooperation. He is a member of the Institution of Engineers (India) and the Indian Ceramic Society.



## Dr N. R. Sircar

Dr N. R. Sircar of CGCRI has been appointed, on promotion, Scientist EI with effect from 17 December 1976. Dr Sircar (born 1 Nov. 1935) graduated with honours in geology (1956) from the Presidency College, Calcutta, and obtained his M. Sc. degree in geology (1958) and D. Phil. (1968) from the University of Calcutta. He was awarded the H. K. Nag prize of the University of Calcutta (1956) and the Prof. N. N. Chatterjee medal by the Asiatic Society (1968) for his contributions in economic geology with special reference to refractory materials.

Dr Sircar joined CGCRI in 1959 and has since been working specially on petrography as applied to glass and ceramics, utilization of indigenous raw materials and development of new processes and products in refractories. He is presently heading the refractories division of the institute. He visited UK during 1968-69 under CSIR-British Council exchange programme of scientists.

Dr Sircar is a member of the council of the Indian Ceramic Society since 1970, founder secretary (honorary) of the Indian Institute of Ceramics since 1973, associate of the Institute of Ceramics (UK) since 1971, fellow of the Indian Institute of Ceramics, and fellow of the Geological, Mining and Metallurgical Society of India.

Dr Sircar has published 40 papers on raw materials, microstructure and characteristics of refractories, and has a patent to his credit.

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Dr S. Durani has been appointed Scientist B at the Central Drug Research Institute, Lucknow (29 July 1977).

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The following personnel have been appointed Scientist B at the Indian Institute of Petroleum (IIP), Dehra Dun: Shri U. C. Agarwal (30 June

1977); Shri V. K. Gupta (2 Aug. 1977); and Dr Lalji Dixit (2 Aug. 1977).

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Promotions at IIP, Dehra Dun, from Scientist B to Scientist C include: Shri A.K. Gupta (7 Dec. 1976); Shri Dinesh Chandra (7 Dec. 1976); Shri Mohd. Anwar (7 Dec. 1976); Shri V.K. Kapoor (7 Dec. 1976); Shri G.C. Srivastava (16 Dec. 1976); Shri J.C. Gupta (24 Dec. 1976); Shri S.K. Chakladar (29 Dec. 1976); Shri M.L. Sagu (17 Jan. 1977); Shri Jai Prakash (19 Jan. 1977); Shri Pradeep Kumar (17 Jan. 1977); Dr A.V. Ramaswamy (2 Feb. 1977); Dr P.S.N. Murthy (10 March 1977); and Dr G.C. Misra (17 April 1977).

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Shri S. K. Kapur of IIP has been promoted to Scientist A consequent on five-year assessment (13 Aug. 1975).

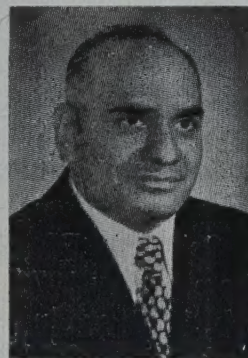
### Honours

## Shri J.G. Parikh

Shri J.G. Parikh, Director, Silk & Art Silk Mills' Research Association, Bombay, has been selected by the Textile Institute, Manchester, for the award of the Institute's medal for distinguished services to the man-made fibre and textile industry and technology. Shri Parikh is to receive the honour at a special function being organized on 25 November 1977 at Manchester.

The Textile Institute has recognized Shri Parikh's outstanding ability for careful planning and thoroughness in organizing the research institute for man-made fibres and textiles and his expert technological management of research.

The Textile Institute, also being the international custodian of the techno-



logical education and scientific publication in the textile field, has honoured Shri Parikh for planning and establishing technical education programme in man-made fibres and textiles, the first of its kind in Asia. Shri Parikh is the editor of the journal 'Man-made Textiles in India'. He is a Fellow of the Textile Institute.

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Shri C. Rajagopal of the National Aeronautical Laboratory, Bangalore, has won, for his photograph 'Ship of the desert', a prize in the photographic competition 'People and vehicles of Asia on the move' organized by the Asian Cultural Centre for Unesco, Tokyo. His photograph 'Morning in Old Delhi' won the Tokyo Koishikawa Rotary Club prize.

## Prof. S. H. Zaidi

Prof. S. H. Zaidi, Director, Industrial Toxicology Research Centre (ITRC), Lucknow, joined the Centre on 16 July 1977 after attending the WHO task group meeting on carbon disulphide at Prague and WHO expert group meeting on 'Early detection of health impairment in occupational exposure to certain heavy metals' at Geneva. During the period of his leave and deputation Dr C. R. Krishna Murti, Scientist F, ITRC, was Acting Director of ITRC [CSIR News, 27 (1977), 103].

## Cultivation and Utilization of Medicinal and Aromatic Plants

The Regional Research Laboratory (RRL), Jammu, has brought out a book under the above title [CSIR News, 26 (1976), 160]. The 590-page book has been published in two editions and the sale price (exclusive of postage and package) per copy is Rs 90 for library edition (rexin bound), and Rs 55 for paper bound edition.

Enquiries regarding the publication may be addressed to the Director, Regional Research Laboratory, Canal Road, Jammu-Tawi 180001.